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VI. *Some Account of Mr. Leeuwenhoek's curious Microscopes, lately presented to the Royal Society. By Martin Folkes, Esq; Vice-President of the Royal Society.*

IT is now above 50 Years, since the late *Mr. Leeuwenboek* first began his Correspondence with the Royal Society; when he was recommended by *Dr. Regnerus de Graaf*, as a Person already considerable by his Microscopical Discoveries, made with Glasses contrived by himself, and excelling even those of the famous *Eustachio Divini*, so much talk'd of in the learned World: And as he has ever since that Time apply'd himself, with the greatest Diligence and Success, to the same Sort of Observations, no Doubt can be made of the Excellency of those Instruments he so long us'd, so much improv'd, and upon the fullest Experience so often commended in his Letters; great Part of which, at his Decease, he thought fit to bequeath to this Society, for whom he ever express'd the greatest Esteem and Respect.

He had, indeed, intimated this Design in several of his Letters, and in his last Will and Testament gave Orders, that the Glasses should be delivered as soon as conveniently might be after his Decease; which was accordingly done, by the Directions of his surviving Daughter, *Mrs. Maria Van Leeuwenboek*, to whose great Care we are oblig'd, for the safe and speedy Delivery of this very curious and valuable Present.

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The Legacy consists of a small *Indian* Cabinet, in the Drawers of which are 13 little Boxes or Cases, each containing two Microscopes, handsomely fitted up in Silver, all which, not only the Glasses, but also the *Apparatus* for managing of them, were made with the late *Mr. Leeuwenhoek's* own Hands: Besides which, they seem to have been put in Order in the Cabinet by himself, as he design'd them to be presented to the Royal Society, each Microscope having had an Object placed before it, and the Whole being accompany'd with a Register of the same, in his own Hand-Writing, as being desirous the Gentlemen of the Society should, without Trouble, be enabled to examine many of those Objects, on which he had made the most considerable Discoveries.

Several of these Objects yet remain before the Microscopes, tho' the greater Number are broken off, which was probably done by the shaking of the Boxes in the Carriage. I have, nevertheless, added a Translation of the Register, as it may serve to give a juster Idea of what *Mr. Leeuwenhoek* design'd by this Legacy, and also be of Use, by putting any curious Observer in Mind of a Number of Minute Subjects, that may in a particular Manner deserve his Attention.

The 13 Cases abovemention'd are numbered from 15 to 27 inclusively, corresponding to which is the Register of the Objects, Two to every Case, as follows.

No. 15. Globules of Blood, from which its Redness proceeds.

A thin Slice of Wood of the Lime-Tree, where the Vessels conveying the Sap are cut transversely.

No. 16.

Nº. 16.

The Eye of a Gnat.

Nº. 17. A crooked Hair, to which adheres a Ring-Worm, with a Piece of the Cuticle.

A small Hair from the Hand, by which it appears those Hairs are not round.

Nº. 18. Flesh of the Codfish (*Cabeljaeum*) shewing how the Fibres lie oblique to the Membranes.

An Embrio of Cochineal, taken from the Egg, in which the Limbs and Horns are conspicuous.

Nº. 19. Small Pipes, which compose the Elephant's Tooth.

Part of the Crystalline Humour, from the Eye of a Whale.

Nº. 20. A Thread of Sheeps-Wool, which is broken, and appears to consist of many lesser Threads.

The Instrument, whence a Spider spins the Threads, that compose his Web.

Nº. 21. A* Granade, or Spark made in striking Fire.

The Vessels in a Leaf of Tea.

Nº. 22. The *Animalcula in Semine Masculino*, of a Lamb taken from the Testicle, Jul. 24. 1702.

A Piece of the Tongue of a Hog, full of sharp Points.

Nº. 23. A Fibre of Codfish, consisting of long slender Particles.

Another of the same.

Nº. 24. A

Nº. 24. A Filament, conveying Nourishment to the Nutmeg, cut transversely.

Another Piece of the same, in which the Figure of the Vessels may be seen.

Nº. 25. Part of the Bone or Tooth abovementioned, consisting of hollow Pipes.

An exceeding thin Membrane, being that which cover'd a very small Muscle.

Nº. 26. Vessels by which Membranes receive Nourishment and Increase.

A Bunch of Hair from the Insect call'd a Hair-Worm.

Nº. 27. The double Silk, spun by the Worm.

The Organ of Sight of a Flie.

It were endless to enter into any Particulars, of what is to be observed in any of these Objects, or indeed to give any Account of *Mr. Leeuwenhoek's* Discoveries; they are so numerous as to make up a considerable Part of the *Philosophical Transactions*, and when collected together, to fill four pretty large Volumes in Quarto, which have been publish'd by him at several Times: And of such Consequence, as to have opened entirely new Scenes in some Parts of *Natural Philosophy*, as we are all sensible, in that famous Discovery of the *Animalcula in Semine Masculino*, which has given a perfectly new Turn to the Theory of Generation, in almost all the Authors that have since wrote upon that Subject.

For the Construction of these Instruments, it is the same in them all, and the *Apparatus* is very simple and convenient: They are all single Microscopes, consisting each of a very small double Convex-Glass, let into

a Socket, between two Silver Plates rivetted together, and pierc'd with a small Hole: The Object is placed on a Silver Point, or Needle, which, by Means of Screws of the same Metal, provided for that Purpose, may be turn'd about, rais'd, or depress'd, and brought nearer, or put farther from the Glass, as the Eye of the Observer, the Nature of the Object, and the convenient Examination of its several Parts may require.

Mr. *Leeuwenhoek* fix'd his Objects, if they were solid, to this Silver Point, with Grew; and when they were Fluid, or of such a Nature as not to be commodiously view'd unless spread upon Glass, he first fitted them on a little Plate of Talc, or excessively thin-blown Glass, which he afterwards glewed to the Needle, in the same Manner as his other Objects.

The Observation, indeed, of the Circulation of the Blood, and some others, require a somewhat different *Apparatus*, and such a one he had, to which he occasionally fix'd these same Microscopes; but as it makes no Part of this Cabinet, I shall omit giving any farther Account of it, only taking Notice that it may be seen in a Letter to the *Royal Society*, of the 12th of *January*, 1689. and printed in his *Arcana Naturæ Detecta*, No. 69. But I was willing to mention just so much, as it may serve to shew the universal Use of these Microscopes, and as it induces me (among other Things) to believe, these were the Kind of Microscopes generally, if not solely, us'd by this curious Gentleman in all his Observations, and to which we are oblig'd for his most surprizing Discoveries.

Another Particular, to the same Purpose, I would not omit, and that is, That upon the late Queen *Mary's*

doing Mr. *Leeuwenhoek* the Honour of a Visit at *Delft*, and viewing his Curiosities with great Satisfaction, he presented her with a Couple of his Microscopes, which, as I have been inform'd by one who had them a considerable Time in his Hands, were of the same Sort as these, and did not any ways differ from one of the 13 Cases contain'd in the Drawers of this Cabinet.

The Glasses are all exceedingly clear, and shew the Object very bright and distinct, which must be owing to the great Care this Gentleman took, in the Choice of his Glass, his Exactness in giving it the true Figure; and afterwards, amongst many, reserving such only for his Use, as he, upon Tryal, found to be most excellent. Their Powers of magnifying are different, as different Sorts of Objects may require; and, as on the one Hand, being all ground Glasses, none of them are so small, and consequently magnify to so great a Degree, as some of those Drops, frequently us'd in other Microscopes; yet, on the other, the Distinctness of these very much exceeds what I have met with in the Glasses of that Sort; and this was what Mr. *Leeuwenhoek* ever principally propos'd to himself, rejecting all those Degrees of magnifying in which he could not so well obtain that End; for he informs us in one of his Letters, where he is speaking of the excessive Praise some give to their Glasses on this Account, that although he had above Forty Years had Glasses by him of an extraordinary Smallness, he had made but very little Use of them; as having found, in a long Course of Experience, that the most considerable Discoveries were to be made with such Glasses as, magnifying but moderately, exhibited the Object with the most perfect Brightness and Distinction.

But however excellent these Glasses may be judg'd, Mr. *Leeuwenhoek*'s Discoveries are not entirely to be imputed to *their* Goodness only: His own great Judgment, and Experience in the Manner of using them, together with the continual Application he gave to that Business, and the indefatigable Industry with which he contemplated often and long upon the same Subject, viewing it under many and different Circumstances, cannot but have enabled him to form better Judgments of the Nature of his Objects, and see farther into their Constitution, than it can be imagined any other Person can do, that neither has the Experience, nor has taken the Pains this curious Author had so long done.

Nor ought we to forget a Piece of Skill, in which he very particularly excell'd, which was that of preparing his Objects in the best Manner, to be view'd by the Microscope; and of this I am perswaded, any one will be satisfied, who shall apply himself to the Examination of some of the same Objects as do yet remain before these Glasses; at least, I have my self found so much Difficulty in this Particular, as to observe a very sensible Difference between the Appearances of the same Object, when apply'd by my self, and when prepared by Mr. *Leeuwenhoek*, tho' view'd with Glasses of the very same Goodness.

I have the rather insisted upon this, as it may be a Caution to us, that we do not rashly condemn any of this Gentleman's Observations, tho' even with his own Glasses, we should not immediately be able to verify them our selves. We are under very great Disadvantages for want of the Experience he had, and he has himself put us in Mind, more than once, that those who are
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the best skill'd in the Use of Magnifying-Glasses, may be misled, if they give too sudden a Judgment upon what they see, or 'till they have been assured from repeated Experiments. But we have seen so many, and those of his most surprizing Discoveries, so perfectly confirm'd, by great Numbers of the most curious and judicious Observers, that there can surely be no Reason to distrust his Accuracy in those others, which have not yet been so frequently or carefully examin'd.

Upon the whole, it is to be hoped, some of the Society will pursue those Enquiries, the late Possessor of these Microscopes was so deservedly famous for; and that as we have lost in Mr. *Leeuwenhoek* a most worthy Member, and a most valuable Correspondent, this last Piece of his Respect to the *Royal Society* will not only enrich our Repository, but both encourage and enable some other diligent Observer to prosecute the same curious and useful Discoveries.
